# MEAA 3D scanning: interim report

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## Abstract

This is an interim report covering the results to date of the use of photogrammetry to turn images of heritage artefacts from Museum of East Asian Art (MEAA) into models suitable for viewing on the web. This project will test whether techniques used in a previous project with Leicester City Council Arts and Museums Service with Roman artefacts (see IOCT) can also be employed with finer more detailed ceramics from the MEAA, without significantly increasing workload or reducing the quality of the resulting 3D models. The aim is to produce 3D models of valuable and delicate heritage items that appear faithful enough to the originals for research and visitor viewing, yet are lightweight enough to be delivered via the web.

## Photogrammetry

Photogrammetry is a technique where photographs are used to construct an object in virtual 3D, from metrics automatically calculated by software from multiple images of an artefact or scene, taken at various camera angles. Photogrammetry (see Walford for a brief explanation, or Wikipedia 'Photogrammetry') is—along with the more demanding and expensive process of laser scanning—often used for the detailed modelling of complex objects, buildings or archaeological locations, but is also available at the simpler end of the technical spectrum; for example Autodesk's 123D Catch software and open source equivalents (Autodesk, Jesse). This project uses *3D Software Object Modeller* or 3DSOM Pro (Jimenez), software which has recently been updated and rebranded (BOB Capture). The use of these techniques for preserving and disseminating information about cultural artefacts is growing rapidly, as evidenced by subject areas in current conferences (see Euromed, CIPA).

Once photographs have been uploaded, there is a significant amount of further work to render these as 3D virtual objects. Much of this is handled by software—first, a 'mesh' is created that approximates the shape of the object, then a 'texture' taken from the actual images is wrapped around the mesh to create a realistic reproduction of the original. However, reflective surfaces, holes, hollow or damaged objects and other complex shapes can demand much manual editing and will produce unsatisfactory results unless the models and photographic 'textures' themselves are manipulated. Further, some images can produce unforeseen results in the software—one example is explained below (item 157).

## The artefacts

Below is a brief report on the current state of each 3D object detailing successes, issues to be addressed and further work. The stills are from the 3D models in their current state, and indicate a reasonable degree of success so far, with some further work to follow. The main issues were:

1. reflective glazes mirroring the 'mat' (white with black dots) on which objects are placed to guide the software;
2. obtaining a faithful reproduction of the delicately thin rim of some originals
3. an insufficient number of photos from the top and base angles (one case only).

Measurements of the originals are in centimetres.

### 48 White-glazed *ding*-type jar with locking lid, 10th/11 C (H: 28 D: 20.5 Base: 11)

Still images 1-4

A reasonable result so far with a nice reproduction of the base. Issues are: a lid that moved between the three groups of photos (1,3), difficulty in reproducing the complex lid fastenings (2,3), reflection from the mat showing as a pale lower half (1) and an overlap on the image texture (2,3). The complex lid fittings may be a persistent issue.

### 56 Cizhou ware globular jar, deep-cut decoration (H: 14.8 D: 15 Base: 9)

Still images 1-3

With an easily-aligned pattern and relatively thick rim, this is the most successful result so far. Issues: a base that needs further refinement to reproduce the original recess (2); some manual work on the final texture to improve the 'patchwork' interior (3).

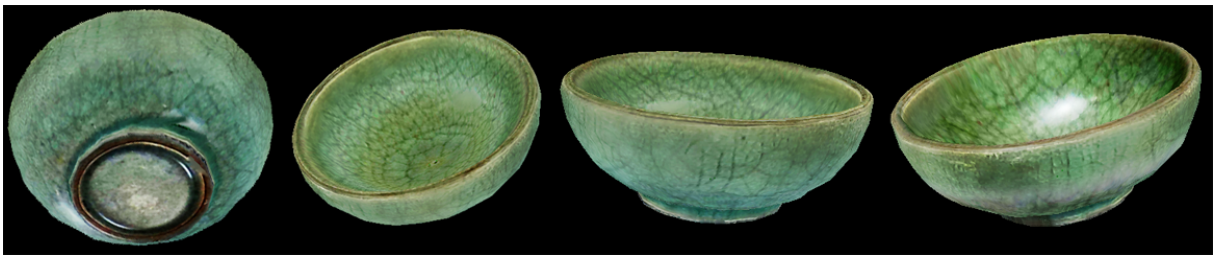
### 98 Jizhou-ware 'leaf-skeleton bowl, 12th C (H:5 D:10.5 Base: 3.5)

Still images 1-3

The images have enabled a result faithful to the original, although further work is required to reproduce the delicate rim, and the minor pale reflection from the mat just about blends into the bowl above the base.

### 102 Longquan guan-type bowl, 13th C (H: 3.5 D: 9 Base: 4.5)

Still images 1-4



This has the same issue with the delicate rim as artefact 98, above, but is otherwise successful. A little more work is needed to generate a more consistent image texture that reproduces the glazing. Also, reflective items can produce mixed results as highlights shift while the object is being rotated for the necessary images. However, although noticeable, this isn't a significant issue.

### 157 Blue and white dish, boys in tubs, late 1500s/early 1600s, Wanli period (H: 2.5 D:17.5 Base: 12.5)

Still images 1-3

The irregular shape of this dish cause the software some issues, as can be seen from the polygonal effect around the outside of the base (1). The interior of the model also requires more work to reproduce the concave part of the dish to indicate the thin profile. The texture also shows some blurring and unwanted overlaps. If these issues can be corrected, this will be a successful result.

**184 Famille-verte enamelled goblet, of European form, mid-Kangxi period, 1680s-1700 (H:12.2 D:7.3)**
Still images 1-3

Although superficially successful, there are multiple issues with this item: the software has produced the pattern multiple times without alignment (1,2), the polygonal shape has been reproduced in the base (1,2), and images of the base and interior are missing. (2,3). The museum has now supplied these and they have been integrated into the final model. The shape has also been corrected However, the pattern alignment persists, but may also be correctable. Overall, the general appearance has been preserved, and with a little more work this item has be made presentable and may be further improved.

## References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